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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/717,602	11/21/2003	Bert Zauderer	04500005AA	8211
7055	7590	08/08/2005	EXAMINER	
GREENBLUM & BERNSTEIN, P.L.C. 1950 ROLAND CLARKE PLACE RESTON, VA 20191			KIM, TAE JUN	
			ART UNIT	PAPER NUMBER
			3746	
DATE MAILED: 08/08/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/717,602

Applicant(s)

ZAUDERER, BERT

Examiner

Ted Kim

Art Unit

3746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☒ Claim(s) 19-21 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the detailed thermocouple structure of claims 6, 7, also the additional fuel injected at the upstream end of the downstream combustion temperature zone (claim 17, 18) must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

2. Claim 10 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 1 requires the injector be a flat fan spray, dependent claim 10 requires the injectors be either a flat fan spray or a conical spray, this renders it unclear what the spray in claim 1 is as the spray pattern is changed in the dependent claim. It is recommended that claim 10 be amended to read --wherein the at least one injector is a hydraulic injector whose flow capacity and droplet size distribution depends on the size of the combustion gas temperature zone.---

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 3, 5-11, 13-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wilkes et al (4,958,488) in view of Zauderer (6,048,510). Wilkes et al teach a gas turbine combustor employing a process for reducing a concentration of nitrogen oxides, NO_x, in an effluent gas stream from a combustion of liquid or gaseous carbonaceous fuel in a gas turbine combustion chamber, comprising the steps of: identifying a gas combustion temperature zone within said combustion chamber that is downstream of a zone of initial gasification of said liquid fuel and initial combustion of said liquid or gaseous carbonaceous fuel and where in an absence of any steps to cool a downstream gas temperature zone, approximately above 2500 °F (col. 4, lines 1+), thermal NO_x production is provided; injecting water droplets of varying size by means of one or more nozzles that form a flat, planar, fan shaped, spray pattern in the form of a curtain (col. 3, lines 20-25) which is oriented perpendicular to said effluent gas stream and is of cross-sectional area to intercept all of the effluent gas stream in said gas combustion temperature zone; with evaporation of said spray pattern cooling said gas combustion temperature zone within said combustion chamber to temperatures, approximately below 2500 °F (col. 4, lines 17), where thermal NO_x production is suppressed. Wilkes et al do

not teach adjusting the pressure or the position of the nozzles nor a NO_x reducing reagent and appear that the spray would be a flat fan spray.

Zauderer teaches (see col. 31, lines 48+) identifying a gas combustion temperature zone within said combustion chamber that is downstream of a zone of initial gasification of said liquid fuel and initial combustion of said liquid or gaseous carbonaceous fuel and where in an absence of any steps to cool a downstream gas temperature zone, approximately above 2500 °F, thermal NO_x production is provided; injecting water droplets of varying size between 10 μm to 1000 μm by means of one or more nozzles that form a flat, planar, fan shaped, spray pattern (Fig. 2D) which is oriented perpendicular to said effluent gas stream and is of cross-sectional area to intercept all of the effluent gas stream in said gas combustion temperature zone; and whose mean and maximum size of said droplets depend on the dimensions of said gas combustion temperature zone in said chamber, varying hydraulic or air atomizing pressure in at least one injector in order to permit distribution and vaporization of different sized droplets at different locations within said gas combustion temperature zone, taking place during said injecting step and adjusting a position of an injector droplet outlet of said at least one injector within said combustion chamber based on an outer edge of said gas combustion temperature zone identified in said identifying step, said adjusting step positioning said injector droplet outlet adjacent to said outer edge of said gas combustion temperature zone identified in said identifying step, with evaporation of said flat, planar, fan-shaped, spray pattern cooling said gas combustion temperature zone within said combustion chamber to

temperatures, approximately below 2500 °F, where thermal NO_x production is suppressed. Zauderer teach an NO_x reducing reagent, (see col. 32, lines 32+), the injector structure of the claims (Figs. 2A-2D), the thermocouple structure (col. 17, line 13+), the flow meters, pressure gauges and valves are either taught or are well known in the art, and would have been obvious to one of ordinary skill in the art to employ to control over the injected water/reagent to enhance the NO_x reduction in the combustor of Wilkes et al.

5. Claims 1-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lysholm (1,988,456) in view of Zauderer (6,048,510) and optionally Paczkowski (4,448,577). Lysholm teaches a process for reducing the concentration of nitrogen oxides, NO_x, in an effluent gas stream from combustion of liquid or gaseous carbonaceous fuel in a gas turbine combustion chamber comprising the steps of: identifying a gas combustion temperature zone within said combustion chamber that is downstream of a zone of initial gasification of said liquid fuel and initial combustion of said liquid or gaseous carbonaceous fuel and where in absence of any steps to cool downstream gas in said gas combustion temperature zone, thermal NO_x production is favored; injecting water droplets of varying size by means of one or more nozzles 38, 40, 39 that form a conical spray pattern which [is opposed in a case of larger mean droplet size – alternative language renders this optional] or in a direction in the case of smaller mean droplet size to an average velocity vector of said effluent gas stream and is of cross-sectional area to intercept all of the effluent gas stream in said gas combustion

temperature zone; and whose mean and maximum size of said droplets depend on the dimensions of said gas combustion temperature zone in said combustion chamber, with evaporation of said conical spray pattern cooling said gas combustion temperature zone within chamber to temperatures, approximately below 2500 °F, where thermal NO_x production is suppressed. Additional fuel is injected from 11, 11b into the combustor at the beginning of a downstream zone. Lysholm does not teach the temperature of the combustion zones, but in the admitted prior art Lefebvre teaches these temperature ranges are typical of those done in the water injection art. Lysholm does not teach adjusting the pressure or the position of the nozzles nor a NO_x reducing reagent and appear that the spray would be a conical spray.

Zauderer teaches (see col. 31, lines 48+) identifying a gas combustion temperature zone within said combustion chamber that is downstream of a zone of initial gasification of said liquid fuel and initial combustion of said liquid or gaseous carbonaceous fuel and where in an absence of any steps to cool a downstream gas temperature zone, approximately above 2500 °F, thermal NO_x production is provided; injecting water droplets of varying size between 10 μm to 1000 μm by means of one or more nozzles that form a conical spray pattern (Figs. 2A, 2B, 2C) which is of cross-sectional area to intercept all of the effluent gas stream as well as a flat fan spray (Fig. 2D) in said gas combustion temperature zone; and whose mean and maximum size of said droplets depend on the dimensions of said gas combustion temperature zone in said chamber, varying hydraulic or air atomizing pressure in at least one injector in order to permit

distribution and vaporization of different sized droplets at different locations within said gas combustion temperature zone, taking place during said injecting step and adjusting a position of an injector droplet outlet of said at least one injector within said combustion chamber based on an outer edge of said gas combustion temperature zone identified in said identifying step, said adjusting step positioning said injector droplet outlet adjacent to said outer edge of said gas combustion temperature zone identified in said identifying step, with evaporation of said flat, planar, fan-shaped, spray pattern cooling said gas combustion temperature zone within said combustion chamber to temperatures, approximately below 2500 °F, where thermal NO_x production is suppressed. Zauderer teach an NO_x reducing reagent, (see col. 32, lines 32+), the injector structure of the claims (Figs. 2A-2C), the thermocouple structure (col. 17, line 13+), the flow meters, pressure gauges and valves are either taught or are well known in the art. It would have been obvious to one of ordinary skill in the art to employ control over the injected water/reagent to enhance the NO_x reduction in the combustor of Lysholm. Alternately, it would have been obvious to employ the flat-fan spray of Zauderer in place of one of the water injectors of Lysholm, e.g. 39a, in order to facilitate an equivalent nozzle arrangement, as taught by Zauderer. As for the water nozzle also facing upstream, this is taught by Zauderer or optionally by Paczkowski by water injectors 16. It would have been obvious to one of ordinary skill in the art to replace the downstream injector with an upstream facing injector, in order to employ an equivalent arrangement used in the art.

Allowable Subject Matter

6. Claims 19-21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Contact Information

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Ted Kim whose telephone number is 571-272-4829. The Examiner can be reached on regular business hours before 5:00 pm, Monday to Thursday and every other Friday.

The fax numbers for the organization where this application is assigned are

571-273-8300 for Regular faxes and 571-273-8300 for After Final faxes.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Thorpe, can be reached at 571-272-4444.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist of Technology Center 3700, whose telephone number is 703-308-0861. General inquiries can also be directed to the Patents Assistance Center whose telephone number is 800-786-9199. Furthermore, a variety of online resources are available at <http://www.uspto.gov/main/patents.htm>



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